**United States Naval Academy**
**Mechanical Engineering Department**

# EM433 Computer-Aided Manufacturing

**Catalog Description:** EM433 Computer-Aided Manufacturing **Credit:** 3 (2-2-3)
This course examines how computers and automation are used in modern manufacturing processes. Topics include machining processes, CNC programming, process planning, dimensioning, and tolerancing. Students particpate in a manufacturing project which utilizes CAD/CAM software to design and manufacture a component using CNC machining equipment.

**Prerequisites:** EM477 Computer-Aided Design

**Textbooks:** Groover, M.P., *Fundamentals of Modern Manufacturing*, Prentice-Hall, 2001 *Required*

**Course Director:** Assoc. Prof. R.E. Link

**Objectives**[1]:

1. To investigate the role of computers and software in the modern manufacturing enterprise (a,b,c).
2. To understand manufacturing processes related to metal removal and the machine tools used in these processes (a,b)
3. To understand the relationship between design decisions and the resulting manufacturing costs (b,c).
4. To understand the wide range of activities and decisions involved in manufacturing operations (b,c).
5. To work in a team environment to develop and demonstrate a manufacturing plan for an assembly of items (b,c,d).

**Course Content:**

| No. | Topic or Subtopic | hrs. |
|---|---|---|
| 1. | Engineering Drawings | 3 |
| 2. | Dimensioning and Tolerancing, Geometric Tolerancing | 6 |
| 3. | Metal Cutting | 2 |
| 4. | Machine Tools and Machining | 4 |
| 5. | CNC Machining | 6 |
| 6. | Cutting Tools | 1 |
| 7. | Production Lines & Automation | 1 |
| 8. | Group Technology | 1 |
| 9. | Process Planning | 1 |
| 10. | Production Planning & Control | 1 |
| 11. | Quality Control | 1 |

**Evaluation:**

| | | |
|---|---|---|
| 1. Quizzes | ___ Yes | _X_ No |
| 2. Homework | _X_ Yes | ___ No |
| 3. Exams | ___ Yes | _X_ No |
| 4. Laboratory Reports | _X_ Yes | ___ No |
| 5. Oral Presentations | _X_ Yes | ___ No |
| 6. Design Reports/Notebooks | ___ Yes | _X_ No |
| 7. Prototypes/Demonstrations | _X_ Yes | ___ No |
| 8. Projects | _X_ Yes | ___ No |
| 9. any other evaluation tools used | ___ Yes | _X_ No |

**Acquired Abilities**[2]:

1.1 Students will demonstrate an understanding of how computers are used for various aspects of the manufacturing enterprise (1)

2.1 Students will demonstrate an understanding of typical metal removal processes (2,4)

2.2 Students will select and specify processes and parameters for machining simple metallic parts (4,7,8).

3.1 Students will demonstrate the ability to specify tolerances and finish requirements for proper functioning of parts in an assembly (2,4,8)

4.1 Students will participate in site visits to actual manufacturing operations to witness mass production and assembly operations (2)

4.2 Students will visit manufacturing plants to discuss the various roles a manufacturing engineer plays in a typical manufacturing plant (5)

5.1 Students will demonstrate the ability to develop detailed manufacturing process plans, including the necessary CNC programs for the machine tools, to produce a series of related parts for an assembly (4,7,8).

5.2 Students will witness their process plans being employed in a machine shop environment to produce actual prototypes of their parts (4,7,8).

**Date of Latest Revision:** 16 NOV 2001

[1] Letters in parenthesis refer to the Program Objectives of the Mechanical Engineering Program.
[2] Numbers in parenthesis refer to the evaluation methods used to assess student performance.